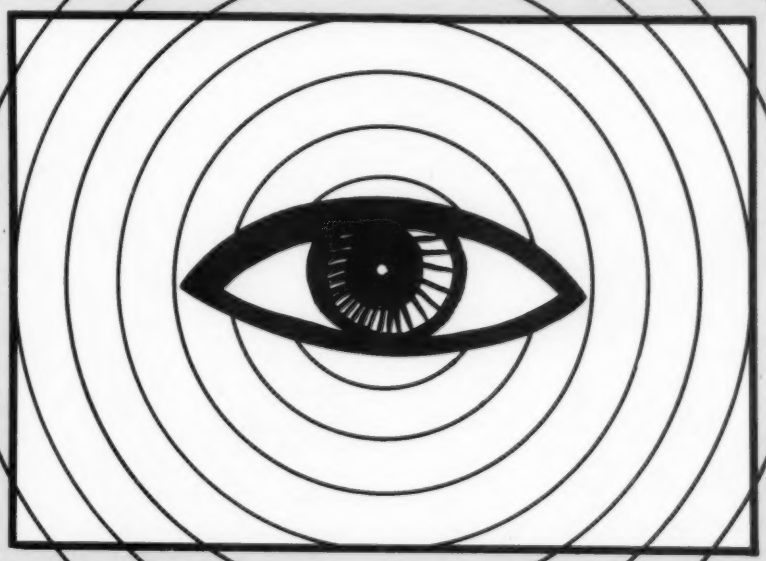
THE MAC Flyer

JUNE 1985



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THE MAC Flyer

For Greater Safety in MAC Air Operations

June 1985 MACRP 127-5 VOL XXXII NO. 6

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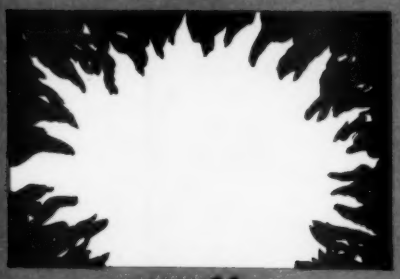

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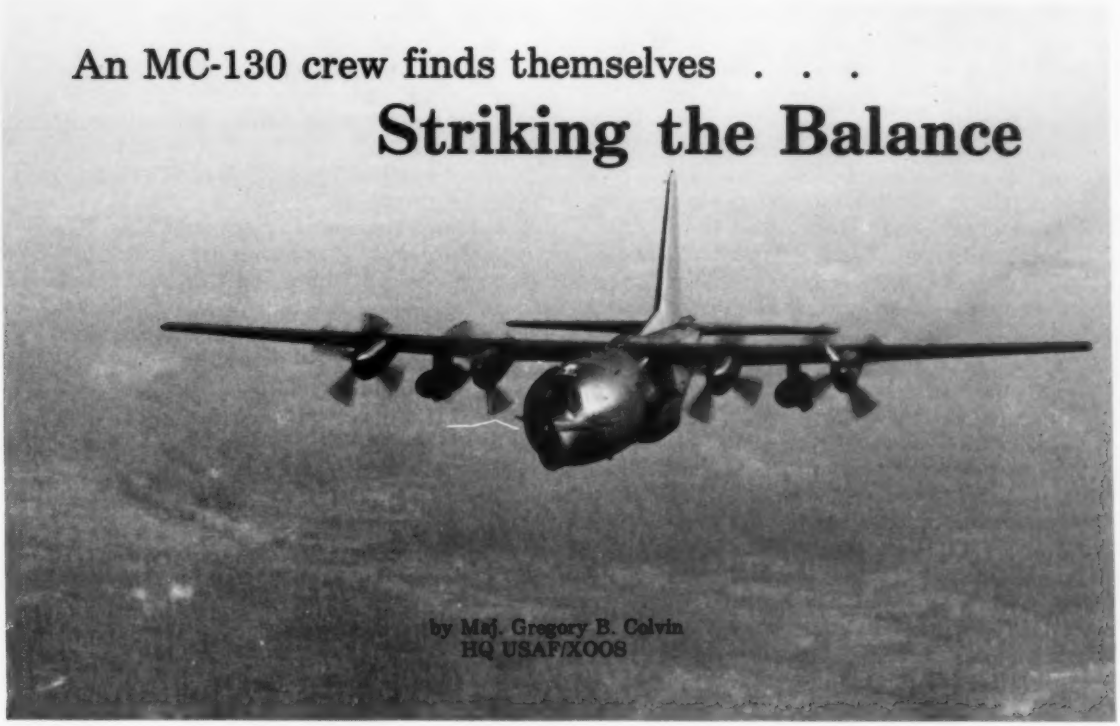
The MAC Flyer is published by the Director of Safety, Military Airlift Command. The contents are informative and not regulatory or directive. Names of people and places in mishap stories are representative and not necessarily of the aircraft or equipment involved. Information in any article may not be construed as incriminating under Article 31, UCMJ.

Contributions, comments and criticisms are welcome. Write: *The MAC Flyer*, HQ MAC/IGFE, Scott AFB, IL 62225-5101, or Autovon 638-3534. The editors reserve the right to make any editorial changes in manuscripts which they believe will improve the material without altering the intended meaning.

Subscriptions are available from: The Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Changes of address for subscription mailing should be sent to GPO. Give both old and new addresses, including zip codes. USAF Active and Air Reserve Forces units establish requirements for this magazine through their publication distributor (DAPD). Other U.S. Military units should consult administrative directives. *The MAC Flyer* is published at an approximate ratio of one magazine for every five MAC aircrew members, and one for every twenty MAC Support personnel. Distribution X; OPR: HQ MAC/IGFE ISSN 0024-788X.

An MC-130 crew finds themselves . . .

Striking the Balance



by Maj. Gregory B. Colvin
HQ USAF/XOOS

(Editor's Note— This story is fiction and doesn't represent any actual persons or occurrences.)

I knew something other than ops normal was going on when my squadron commander met my training flight at 0230. He told me to be in his office at 0700 with the rest of my crew ready to brief the wing commander on the Fulton surface-to-air recovery system (STAR). In the meantime, I was not to discuss my short night with anybody. I debriefed my Combat Talon "students" on our night, mountain, terrain-following radar (TFR) ride and went home at 0400.

When I got to the office a few hours later, the commander started right in with the business at hand. A diplomat assigned to Thailand had been kidnapped the day before. Although the Thai government was convinced a group of terrorists was responsible, some press reports accused the US of conspiracy with the Thais in the matter.

"This is close hold," my commander continued. "The Thais asked specifically for a STAR special operations crew to assist them in their plan to recover the diplomat. Do you have any reservations about flying this mission?"

"No sir. What's been done so far?"

In the wing commander's office, my crew reviewed the information before I briefed what was required to bring it all together. Then a staff officer from some vault in the Pentagon got up to brief the big picture.

"The information I have is extremely sensitive, but you may discuss it with the Thai officials you'll be working with when you arrive there. You'll depart at 2300 local tonight to get to U'Tapao Air Base as quickly as your MC-130 can get you there, we figure about 48 hours from now. Your inflight

Honorable Mention, 1984 MAC Flying Safety Writing Contest

refueling is coordinated, as are your refuelings in Adak and Sapporo. You'll RON in Adak and get an intel update.

"We agree with the Thai assessment that the kidnappers are terrorists. So far there are no demands, but one objective seems to be to aggravate East-West relations. Thai sources indicated that the group was heading for the eastern border area. This is a complicated and delicate situation for many people. You'll be the only US force commander there. The President has delegated authority to you to balance mission safety with the potential for combat in support of Thai needs."

Some balance! We finished off with some technical points. We had a discrete satellite communication frequency, and we could expect to be monitored by the highest NCA channels. No pressure, right? I received blanket waiver authority to do the mission, with the admonition that safety was always part of the mission; crashing was not.

When I arrived at the base that evening, everything looked ops normal as if for a routine training flight. In fact, another crew had preflighted the aircraft and prepared our first flight plan, weather, NOTAMs and classified kits. They too thought we were leaving early for the exercise.

The flight out to the refueling track near Seattle was no problem. But the weather update on the radio indicated the weather after Shemya was bad and that Adak would be at minimums. We pressed ahead with a waiver to use 100-1/4 minimums. We needed it, too. I didn't see the strobes early enough for a safe landing on the first try, so we went around and made it on the second.

After 15 hours, we were too tired to chuckle when the base commander met us and apologized for putting us up two to a room in the women's dormitory, the only available space. We ate a good meal, said goodnight, and crashed. About midnight my copilot woke me and told me the base commander was waiting for me in his office. I showered and went to the meeting while the rest of my crew had a midnight breakfast and got the aircraft ready to fly.

The commander had the latest intelligence reports in sealed envelopes. It seemed the Thais were doing a good job tracking the kidnappers, and thought they knew their location. That was the good news. The bad news was that the weather in Sapporo was bad and that the weather in Thailand could be worse.

We got into Sapporo right under a 100-foot ceiling. The copilot, who had never seen real minimum approaches, now appreciated the word "minimum." We updated our weather and NOTAMs before launching back into the clouds.

As we crossed the South China Sea we began to get disturbing weather updates through the AF Command Center. It seemed the destination weather would be as bad as forecast, but that the enroute winds were much higher than predicted, which could eat into our fuel reserve. Still, the order of the day was press, so we did.

The crew didn't bat an eye when I briefed another weather-at-minimums approach with maximum use of our onboard inertial navigation, TF radar, multiple radar/radio altimeters, and backup timing procedures. After trying five approaches and not even seeing the strobe lights, the crew *did* bat an eye when I briefed zero-zero procedures. After trying for an hour to get into the field, which had the same weather as all our alternates, we were getting short on gas—really short. I calculated that we were down to 45 minutes of fuel, which meant I was pushing the margin of safety. Although we were all tired, the adrenaline levels kept us wide awake.

We asked the controller to continue his instructions all the way to touchdown and to be sure the runway lights were at maximum intensity so we could stay between them when the time came. On the sixth approach at 100 feet, we saw what we had seen five times before—nothing. We pressed, and at 75 feet we began to see lights. At 50 feet there was no doubt we were in the runway environment, so I continued straight ahead and saw the center line coming at me just in time to flare and roll out. The visibility was so bad the tower had no idea if we had landed or not. They had to send out three trucks, one for the nose and each wing tip so we could find our way on to the parking ramp.

The Thais were glad to see us. The wing commander personally drove out to help marshal us into parking where six armed guards immediately surrounded the aircraft. Obviously, security was tight. After the greetings and introductions, the Thais realized that we were all dead tired. I sent the crew off to

bed and went with the wing commander for an update on the mission. After the briefing, I sent my status reports off to Washington and caught up on some well-earned sleep.

About 2200, the State Department representative woke me, "Captain, wake up. Jump in the shower and meet me in the wing commander's office right away. Your crew is already up and on the way."

The briefing began as soon as I walked in. A mechanic in the border area had repaired two flat tires on a car. He noticed a case of ammunition in the trunk of the car driven by two foreigners who spoke neither Thai nor English, but who gave him a large tip. He reported the incident which led to a helicopter search of the area.

During the search near the border, the helicopter was shot down, but the whole sequence was caught dramatically on film by a news crew who happened to be in the area. Their film showed two antiaircraft artillery (AAA) sites near what appeared to be a bunker or cave complex right on the border. One of the AAA sites had downed the chopper. Local farmers reported their children saw armed men take a blindfolded man into the bunker. If so, it seemed highly probable we had found what we wanted.

The Thais had a good idea of what we would be up against. We sat back and listened as a Thai special forces captain briefed a well-conceived rescue plan. They were familiar with the capabilities of our MC-130 and knew exactly what they wanted us to do.

First, we were to climb to 20,000 feet and drop a Thai special forces team which would glide square parachutes into the objective area. There, they would reconnoiter the situation and confirm the diplomat was really in the bunker. Next, F-5s and helicopter gunships would attack to allow other helicopters to deliver Thai rangers who would engage the force around the bunker while the commando team escaped with the diplomat. The commando team would use special weapons and signals that would let us locate them amid the expected fire fight.

Then we would fly over the area and high-speed drop our STAR kit which included all the hardware required to extract the diplomat straight up out of the combat zone. Intelligence analysts predicted the fire fight would be a fierce one because the kidnappers were extremely well armed. On top of that, these men were terrorists who were prepared to die rather than surrender.

My crew listened intently to what sounded like a good plan. Admittedly it had risks, but well calculated risks. We separated from the rest of the forces to plot our mission around the terrain and the reported positions of the AAA sites. Since we didn't know if the weapons were radar guided or included infrared missiles, we planned to fly as low and as fast as possible, something that made navigation a challenge and which we had to do totally with onboard systems.

By then it was 0200, time to get our air machine ready. We started engines and taxied on light signals from the tower, and were soon climbing eastward towards the border. The Thai commando team looked mean and efficient. I was glad they were on my side—or I on theirs. At 20,000 feet, the team jumped out into the night and soon signaled on secure FM radio that they were on the ground safely. We descended and prepared for our high-speed drop which would occur after they had started the battle by taking the diplomat out of the bunker—no easy task.

Less than an hour later, we heard the coded signal and the beauty of the Oriental dawn became surreal with blinding flashes from modern weapons of war. Helicopter gunships were dueling with AAA sites which subsequently came under attack from F-5 fighters and advancing ranger teams. In the midst of the fierce fight, we heard the now-familiar voice of the Thai special forces captain calling in our STAR kit drop, a good sign that his portion of the mission was going as planned.

I pushed up the throttles and banked towards the action. As we turned towards the bunker we could already see the bright orange smoke marker amidst the black and white puffs from the fire fight. As we slipped up the valley at 250 feet, we completed the STAR drop checklist. Zeroing in on the orange smoke, we could hear the explosions of the battle above the engines' whine and hoped our friends had the AAA sites under control. With precise discipline my crew put the kit right on the orange smoke, but as I called "Greenlight," I heard trouble on the interphone.

"I'm hit."

"Crew, IP, check-in." I could see everyone on the flight deck was in one piece, but the check-in stopped after the RO and EWO. "Loads, where are you? RO, find out what is going on."

"Roger, sir. One load is hit in the shoulder and bleeding bad. The other is OK, but his interphone cord was severed by the bullets that tore up the back end. There are lots of holes, but no fires or leaks inside."

When my second load put on another headset, he advised me the number-two engine was streaming oil badly. By then the gauges were showing trouble, so I called for the emergency shutdown. I discussed the STAR mission after we had put our wounded LM in the RO's seat and stopped his bleeding as best we could. The EWO had to divide his attention between first aid and threats. The RO assured me he could perform the fishing maneuver for the STAR line, something the LMs had taught him in training for STAR emergencies like ours now.

After a short deliberation, I decided we could do the STAR on three engines. My number-one LM was in shock, but sufficiently stable so that a few minutes more would not put him in a more life-threatening situation. We would press, but this time it would not be through fog, but through another hail of bullets.

As we headed for the recovery zone, we saw the STAR balloon ascending above the trees. With the doors and hatches open, we could smell the cordite from the battle still raging below as I made final corrections to snatch the STAR line. Just as I did, two F-5s nearly collided with us head-on as they flashed by to take out the AAA site that had hosed us the first time. I heard the guys in the back cheer as they saw the diplomat sail up over the trees and the AAA site went up in smoke. As soon as we were out of range of the battle I climbed to 2,000 feet and transferred control to my first pilot so I could welcome the diplomat on board and check on our wounded man. My loadmaster gave me a weak smile and thumbs up. I could see the bleeding was under control, and promised we would have him in a hospital within an hour.

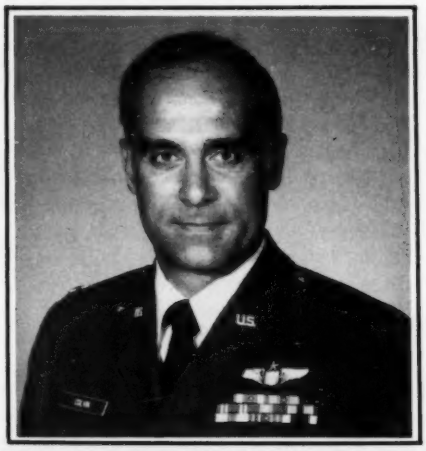
Then I helped the diplomat onboard and out of the STAR suit. He gave me a big hug and burst into laughter when I introduced myself as a USAF captain.

His English was impeccable. "You guys are something else. Damndest ride I ever took. Thank you. Thank you very much."

I left everyone in the back to nurse our wounded loadmaster while I went up front to nurse my wounded airplane, now leaking hydraulic fluid, fuel, and pieces of sheet metal that occasionally blew off from around the holes in the back. I reminded the crew that their ironclad discipline and professionalism had pulled us through some very hard moments the past week, and that they needed to keep up their concentration just a little longer to make sure we all got home safely. I was interrupted by SATCOM.

"Bunny 07, this is the President. I know from my Command Center links that you have wounded on board and several flight emergencies, but I insisted on interrupting for a moment to say thanks. You've done a superb job and the nation is proud of you."

"Thank you, sir." Anytime, anyplace, I thought silently.



Major Colvin is a 1972 graduate of Franklin and Marshall College, Lancaster, Pennsylvania, and received his commission through OTS in 1972. After pilot training at Columbus AFB, Maj. Colvin was assigned to the 1st SOS, then based at Kadena AB, Japan. He continued flying special operations C-130s at 7th SOS at Rhein-Main AB, Germany, coming back to Hurlburt Field as an instructor pilot with the 8th SOS. After a tour flying Transall C-160s with the German Air Force, Maj. Colvin became the C-130 special operations personnel officer at HQ AFMPC, Randolph AFB. In 1983, he was assigned to HQ USAF/XOOS as a special operations staff officer. Maj. Colvin is a three-time winner in the MAC Flying Safety Writing Contest, winning in 1981, 1982 and 1984.

Excellence In Airmanship

Left to right: MSgt. Richard A. Dickow (Flight Examiner Flight Engineer), Maj. John H. Taylor (Flight Examiner Aircraft Commander), Capt. Wesley G. Langland (Flight Examiner Navigator) and SSgt. Jerome M. Skiles (Loadmaster). Not shown: Lt. Col. Jim L. Folsom (Flight Examiner Aircraft Commander) and SSgt. Marshall H. Hopkins (Loadmaster).

Maj. John Taylor and crew, 731 TAS, had just departed Rosecrans Memorial Airport at St. Joseph, Missouri, on a 300-foot low level hostile environment training mission which included an actual CDS airdrop. Shortly after reaching an initial climb speed of 180 knots, Major Taylor tried to put his C-130B into a left climbing turn to intercept the departure course. The aircraft gave appropriate elevator response, but the crew noted little left roll response. Major Taylor centered the controls, then attempted another left turn. This time there was no roll response. Suddenly, the aircraft began an uncommanded roll to the left, and full right aileron input had no effect. Major Taylor immediately asked the copilot, Lt. Col. Jim Folsom, to try his controls, but again there was no response with full right aileron.

Directing the copilot to declare an emergency, Major Taylor was finally able to regain some roll response through skillful use of right aileron trim and rudder inputs. He found that approximately 3/4 to full aileron trim deflection was sufficient to start an acceptable roll rate, which could then be stopped or reversed by applying aileron trim in the opposite direction. Using this technique, the crew established themselves on a five-mile final approach and began to slow to 170 knots, lowering 50 percent flaps in the process.

As the airspeed decreased, however, use of aileron trim became more difficult. Finally, at approximately 150 knots, aileron trim became completely ineffective and Major Taylor was forced to use rudder and asymmetrical power to control the aircraft. This resulted in a final approach that was a series of left and right descending slips, extremely difficult to control precisely. Just prior to runway contact, the pilots slipped the aircraft once more, aligning it with runway centerline, then used opposite rudder to stop all drift. Amazingly, the touchdown and rollout were uneventful.

Post flight maintenance inspection of the aircraft revealed the aileron bellcrank had moved aft and off the splines on its shaft, despite the fact the locking bolt was still in place and still had the factory seal. This malfunction resulted in total loss of aileron control.

Major Taylor and Lieutenant Colonel Folsom demonstrated outstanding airmanship and crew coordination and were clearly responsible for preventing the potential loss of a valuable Air Force aircraft and its crew. They are truly deserving of the Excellence in Airmanship Award.

Mishap With A Moral

Old Habits—Bad Habits?

Shortly after 0930 local on 21 November 1980, a Continental Airlines/Air Micronesia Boeing 727-92C approached its destination, the Pacific island of Yap, on the third leg of its planned itinerary. Following a routine descent, the experienced crew configured the aircraft for a visual approach to the 4,820-foot coral and asphalt runway at Yap Airport, some 450 miles southwest of Guam.

The captain made a low, flat approach to the runway, reducing power to idle after passing through 50 feet AGL. At that point the aircraft's sink rate began to increase, resulting in a "hard" touchdown 13 feet short of the runway threshold.

Immediately upon touchdown, the right main landing gear separated from the aircraft, causing the jetliner to veer off the runway and into the surrounding jungle. As the aircraft came to a stop, a severe fire erupted. All 73 occupants—67 passengers and 6 crew—safely evacuated the airliner, which was virtually destroyed by fire. Miraculously, there were no fatalities and only three serious injuries to those on board.

The Investigation

The National Transportation Safety Board (NTSB) investigation centered around the crew's final approach into Yap. Following an analysis of cockpit voice and flight data recorders, as well as interviews with the crewmembers, the NTSB investigators made the following observations.

The Board determined the captain flew a flatter-than-normal approach (1.5° glide slope) to the runway. This flat approach required higher power settings and was flown to an aim point 300 feet down the runway. (Company policy directed a 3° glide slope and an aim point 1000 feet down the runway.)

When the aircraft descended to 50 feet AGL, the captain reduced power to idle,

causing an increase in sink rate. The high sink rate, combined with the shorter than normal aim point, caused the aircraft to touch down 13 feet short of the threshold, landing on terrain with over 4° of upslope. The combination of high sink rate and impact with rising terrain exceeded the structural limits of the right main landing gear, shearing it off. The aircraft departed the runway and caught fire following the initial impact.

Flight Attendants

When the B-727 finally came to a stop in the jungle underbrush, the flight attendants immediately began directing evacuation of the passengers. The passengers and crew exited the aircraft in approximately 55 seconds, despite the fact the aft stairs were not used due to unfamiliarity with emergency deployment procedures, and the right side emergency exits were all blocked by the post-crash fire. The rapid evacuation was made despite "thick, acrid and suffocating smoke." The Board felt some passengers might have been trapped and killed by the smoke and fire if the evacuation had taken only a few seconds longer.

Deviations from Procedures

The NTSB discovered the crew had

deviated from a number of their company operating procedures. One of the most flagrant deviations involved cockpit communications procedures. Although they completed all required checklists, the crew didn't follow the "sterile cockpit" policy directed by their company. Transcripts of the cockpit voice recorder revealed conversations among the aircrew concerning golf courses, LORAN stations, abandoned airfields and motels—all while on approach to the destination airfield. After configuring the aircraft, members of the flight crew took pictures of the airfield. Complete with instructions on how to operate the camera, one crewmember took a final picture during the turn to final, only 47 seconds prior to impact.

A final problem existed with the captain's power reduction habits. At the time of the accident, he was certified in both the DC-10 and B-727 aircraft, with the majority of his flying time in the last 30 days in the DC-10. The Board felt the captain's premature reduction of thrust on final approach may have developed during his extensive DC-10 experience. These thrust reduction habits, while appropriate to the DC-10, were totally inappropriate to the B-727, especially during a low, flat approach.

Findings

As a result of their investigation, the NTSB issued 17 findings, the most important of which are summarized below.

- The captain had been flying DC-10 aircraft as captain for about 3½ years prior to November 1980.
- The captain had not landed a B-727 aircraft for 61 days before the date of the accident. He made one landing at Saipan on the day of the accident.
- The captain flew a flat, dragged-in final approach with about a 1.5° glide slope which required excess thrust.
- The captain reduced the throttles to idle 50 feet above the runway elevation, and short of the runway threshold.
- The aircraft touched down 13 feet short of the approach end of the landing runway, causing the right main landing gear to separate at initial ground contact.
- Fire erupted around the damaged right wing area as the aircraft came to a stop.
- The crew and passengers evacuated the aircraft in about 55 seconds.

Probable Cause

The National Transportation Safety Board determined the probable cause of this accident was the captain's premature reduction of thrust combined with flying a shallow approach angle to an improper aim point. These actions resulted in a high rate of descent and a touchdown on upward sloping terrain short of the runway threshold. This generated loads that exceeded the design strength and failed the right gear. Other factors contributing to the accident were the captain's lack of recent experience in the B-727 aircraft and a transfer of his DC-10 aircraft landing habits and techniques to the B-727 aircraft.

Applications to MAC

As MAC crewmembers, we are never required to be qualified in two different aircraft—or are we? Granted, Air Reserve and Air National Guard crewmembers often fly one aircraft in their civilian occupation and another when wearing the blue suit or the green bag. But how about the rest of us?

We often practice approaches and landings in an extremely lightweight aircraft. But it's a totally different aircraft on approach and landing when fully loaded with cargo, passengers and fuel. As in this mishap, the thrust reduction habits learned in lightweight aircraft are not necessarily appropriate in an aircraft at or near maximum gross weight.

How often do we violate our interphone procedures during descent, approach and landing? The crew involved in this accident is probably not the only group to discuss golf courses, motels, or restaurants when "sterile cockpit" or "interphone discipline" is supposed to be maintained.

Finally, on a positive note, the actions of the flight attendants on this crew were superb. Their well-rehearsed, calm instructions to the passengers following the impact, allowed a safe, rapid evacuation of a burning aircraft. Are we all prepared to handle any ground or airborne emergency with as much skill and professionalism?

Adapted from NTSB/AAR-81-7

The summer sun may lead to . . .

Thermal Stress

During the summer months, flightlines get about as hot as anywhere in the world. All that concrete bounces the sun's heat right back in your face and aircraft heat up like furnaces. The temperatures generated in such an environment can be hazardous for those working there. A little knowledge about how the body copes with heat and some of the precautions individuals can take reduces this risk to manageable proportions.

The human body can control its temperature through several mechanisms. Of these, the most important for individuals on the flightline are radiation, convection, metabolism, and evaporation.

The loss of body heat by radiation and convection is very important when the temperature is lower. Radiation and convection, as heat loss mechanisms, cease when the air temperature reaches body temperature (98.6°F). Wearing improper clothing during high temperatures allows radiation to actually increase body temperature by absorbing heat through exposed skin.

Once the temperature reaches 98-99°F, evaporation is the only method of heat loss the body has. Evaporative cooling is achieved by heat transfer from the secretion and drying of sweat and the exhalation of water vapor. This is where humidity comes into the game. If the air is perfectly dry and an individual drinks enough water and wears proper clothing, the person could survive very high temperatures (assuming no exertion). But as humidity increases, evaporative cooling becomes less effective and thus heat tolerance decreases. This difference is obvious to anyone who has worked on flightlines in both Georgia and Arizona during the summer, for example.

Air movement aids evaporation because the layer of saturated air next to the skin is replaced by dryer air. This is why fanning helps cool you off. Sweat must evaporate to cool you. Sweat dripping off your body is useless as a cooling mechanism.

The three most critical effects of heat stress are exhaustion, cramps, and stroke. Heat exhaustion is the result of excessive sweating, usually over several days, with inadequate replacement of water and/or salt. The victim's circulation volume actually drops, he or she will usually become weak, have cool, clammy skin, will complain of fatigue, and have slight mental confusion. The individual usually feels excessively drained, but not hot. Even mild effects can contribute to inattention and improper procedures, increasing your risk of mishap and injury. This commonly hits a person working in an enclosed "sweat box" type environment where the lack of circulating air hinders evaporation and renders sweating ineffective. If you or your troops feel weak and tired, are sweating profusely and are short of breath, get out of the sweat box, drink fluids (not coffee or alcohol) and rest.

"Without immediate cooling, brain damage may occur."

If you are not used to high temperatures, you are most prone to heat exhaustion, but even an acclimatized person can develop the symptoms. Inadequate fluid intake is the cause. So if you are flying a couple of sorties on a nice day, make sure you get enough to drink between missions. If you are sweating and have an inadequate salt intake, you may experience cramps in the muscles being exercised. These cramps will continue until the salt deficiency is corrected. Generally, a little extra salt with meals is all that is necessary. Be sure you take plenty of liquids, too. You can overdo it with the salt, but not the fluids.

Heat stroke is the most serious of the thermal stress effects. It is a true medical emergency. Typically, the victim is working hard, generating a metabolic heat load in excess of what his cooling mechanisms (evaporation, radiation) can dissipate. This, too, usually occurs in high humidity, rendering sweating relatively ineffective. What happens is the core temperature of the body begins to rise and at a certain point, usually around 103°-104°F, the body's temperature control center in the brain shuts off. Now, sweating stops altogether, and the temperature really shoots up. The victim's skin is red, hot, and dry. Additionally, the person becomes confused, may have seizures, and can even lapse into a coma. Without immediate cooling, the patient will incur brain damage and likely die. The treatment is to immediately cool the body by immersion, cold blankets, cold water spraying and fanning, and cold water enemas. Don't give fluids if the victim is unconscious. Most important, *get medical aid fast.*

There are several things a person can do to prevent heat stress.

Slow down. With physical exertion, more than 75 percent of the increased metabolism appears as heat. Muscular exercise can raise the body temperature 4°F or more. So plan for extra time to preflight, and if you have to get a spare aircraft and are hurrying to make a takeoff or range time, be extra careful. The increased exposure to heat can affect your performance in the cockpit.

Drink more. The normal person needs 2 to 3 quarts of water per day, without exertion or hot weather. You can lose almost that much in an hour working in high heat.

Eat sensibly. For most people, salting food provides enough salt (about 3 grams per day). Supplemental salt should only be taken on the advice of the flight surgeon. During hot weather, low protein diets are best since protein increases heat production. Sorry, steak lovers.

Don't overdo it. If you start to feel any of the signs of heat stress, quit, get to a cool place, drink some fluids, and if you really feel bad, see the flight surgeon.

Heat is a part of everyday operations, and for some of us a welcome change from the cold and damp of winter. With the proper precautions, we can continue to do the job assigned without undue risk and still be able to enjoy summer fun.

courtesy of: *Flight Crew Magazine*

TMF Instrument Quiz

Your new copilot, who's never even been overseas, fancies himself a DD Form 1801 expert and wants you, the squadron's most experienced instructor, to take a look at a quiz he'd like to present at the next pilots' meeting. He's waiting patiently for you to complete the quiz to get your reaction. Your goal, as a good instructor, is to avoid looking foolish in front of the young aviator. Good luck!

Refer to the sample DD Form 1801 on the following page as needed.

1. The DD Form 1801 may not normally be used to file a stopover flight plan.
   a. True
   b. False

2. If flying multiple sorties, under ICAO rules, the pilot or his/her representative is required to advise Air Traffic Service if departure for subsequent legs will be delayed in excess of _____ minutes for IFR flights or _____ minutes for VFR flights.
   a. 15, 30
   b. 30, 60
   c. 15, 45
   d. not specified under ICAO

3. If the pilot or his/her designated representative does not notify Air Traffic Service of a departure delay within the prescribed time, the flight plan may be cancelled.
   a. True
   b. False

4. In Block Eight of the sample DD Form 1801, the "I" and the "M" signify _____ and _____.
   a. IFR, Military
   b. IFR, Medium (wake turbulence category)
   c. International, MAC
   d. IMC, MAC

5. In Block Nine of the sample 1801, the "M" signifies _____.
   a. MAC
   b. Military
   c. Medium (wake turbulence category)
   d. none of the above

6. In Block 10 of the 1801, the "S" indicates standard COM/NAV/Approach Aid equipment. What constitutes "standard?"
   a. TACAN, VOR, ILS and VHF radio
   b. VHF radio, VOR, ILS and ADF
   c. DME, TACAN, VOR and VHF radio
   d. ADF, ILS, UHF radio and 4096 code transponder

7. If other COM/NAV/Approach Aid equipment is required to fly the route, use the appropriate letter to designate the equipment.

Match the following letters with the appropriate equipment.

Equipment	Designation
___ TACAN	A
___ LORAN C	C
___ Doppler	D
___ Inertial Navigation	H
___ LORAN A	I
___ Omega	M
___ DME	P
___ UHF radio	T
___ HF radio	U
___ other equipment carried	Z

DOD INTERNATIONAL FLIGHT PLAN

PRIORITY INDICATOR | FF | ADDRESSEE(S) INDICATOR(S)

FILING DATE/TIME | ORIGINATOR INDICATOR

SPECIFIC IDENTIFICATION OF ADDRESSEE(S) AND/OR ORIGINATOR

3 DESCRIPTION	7 AIRCRAFT IDENTIFICATION AND SSR DATA	8 FLT RULES AND TYPE OF FLIGHT
(FPL	E12345A	IM

9 NO. AND TYPE ACFT AND TURBULENCE CATEGORY	10 COM/NAV/APP EQUIP	SSR
C-9/M	STUID	/ 4

13 AERODROME OF DEPARTURE AND TIME | PIR BOUNDARIES AND ESTIMATED TIMES

EDAF 0500 →

15 SPEED AND LEVEL | ROUTE

0200A030 → DF 9M SEX

17 AERODROME OF DESTINATION AND ETA | ALTERNATE AERODROME(S)

EDAR 0530 → EDAF

18 OTHER INFORMATION

REG/*12345 PASS ATD/ETA/ATA

OPR/US MIL TO EDAFZP AND EDARYN

STS/HOSP DV/A50 BZ FLT)

NOT FOR TRANSMISSION

SUPPLEMENTARY INFORMATION

19 ENDURANCE | PERSONS ON BOARD | EMERGENCY AND SURVIVAL EQUIPMENT

FUEL/0400 → POB/9+PAX → RDO/ 121.5 → 243 → 500 → 8364

TYPE OF EQUIPMENT							LIFE JACKETS		RADIO FREQ.
POLAR →	DESERT →	MARITIME →	JUNGLE →	GLOBAL →	JACKETS →	LIGHT →	FLUORESCEIN →		

DINGHIES	COLOR	NUMBER	TOTAL CAPACITY	OTHER EQUIPMENT
DINGHIES →	COVER ORANGE	3/60 →	RMK/ FLARES & CPI	)

REMARKS

RMK/MODE C INOP — FRANKFURT ACC HAS APPROVED

AIRCRAFT SERIAL NUMBERS AND TYPE OF AIRCRAFT IN FLIGHT

12345

CREW LIST ☑ ATTACHED ☐ LOCATED AT:

PASSENGER MANIFEST ☐ ATTACHED ☑ LOCATED AT: EDAF PAX SERVICE

AIRCRAFT HOME STATION OR ORGANIZATION	NAME OF PILOT IN COMMAND: INSTRUMENT RATING	SIGNATURE OF PILOT IN COMMAND OR DESIGNATED REPRESENTATIVE
EDAF	TERROR	

PILOT'S PREFLIGHT CHECK		BASE OPERATIONS USE			APPROVAL
✓	NOTAMS	CURRENT P/FCIC CARD	FPL		REQUEST CLEARANCE AFTER (Z)
✓	AIR SPACE RESTRICTIONS	SPECIAL BRIEFINGS			
✓	AIRCRAFT/DEST NAV AIDS	DIP CLNC/US CODE /PPR			
✓	WEATHER AND WINDS	BZ FLT/GAT/OAT	TA		MISSION/CONTROL AUTHORITY
✓	SIDS, FLIPS AND CHARTS	VIP CODE/BLOCK TIME			
✓	FLIGHT PLAN LOG	PAX MANIFEST	TWR		MAC
	POPPY SEED REPORTS	CUSTOMS FORM			
✓	FOREIGN CLNC GUIDE	FLT ORDERS OR CREW LIST			SIGNATURE OF APPROVING AUTHORITY
✓	COMMAND LOCAL DIRECTIVES	FUEL REQUIREMENTS			

DD FORM 1 MAR 79 1801 PREVIOUS EDITION WILL BE USED

8. In Block 10 of the sample 1801, the "4" signifies _____.
   a. 4096 code transponder with mode A but no mode C
   b. 4096 code transponder with mode 4 capability
   c. transponder–no coding
   d. none of the above

9. If no ICAO identifier exists for the departure point, enter the following in Block 13 of the 1801.
   a. YYYY
   b. No ID
   c. No ICAO
   d. ZZZZ

10. In Block 15 of the sample 1801, "A030" signifies _____.
   a. airspeed 300 knots
   b. altitude 30,000 feet
   c. altitude 3,000 feet
   d. altitude 300 feet

11. During flights off Airways/Routes, enter points along the route not more than _____ minutes flying time or _____ nautical miles apart including each point at which a change of speed or level, a change of track or a change of flight rule is planned.
   a. 15, 100
   b. 30, 200
   c. 45, 250
   d. 60, 300

12. An entry must be made under the route of flight whenever a change to the cruising speed or cruising level is planned. A planned airspeed change of ___ % TAS or ___ MACH requires such an entry.
   a. 5%, .01
   b. 7%, .015
   c. 3%, .01
   d. 10%, .02

13. The estimated time of arrival for IFR flights denotes the time at which it is estimated that the aircraft will land at the destination aerodrome.
   a. True
   b. False

14. In Item 19 of the sample 1801, the "243" indicates _____.
   a. the guard frequency monitored on board the aircraft
   b. the frequency of the radio found in your life jacket
   c. the frequency of the portable radio carried as survival equipment
   d. none of the above is correct

15. Base Operations will not process a DD Form 1801 unless the pilot in command or his/her representative signs the pilot in command block of the flight plan.
   a. True
   b. False

The Answers

The following answers are found in FLIP General Planning.

1. (a) see para. 4-4, a.(4)
2. (b) see para. 4-4, a.(4)
3. (a) see para. 4-4, a.(4)
4. (a) see para. 4-4, item 8, a/b.
5. (c) see para. 4-4, item 9, c.
6. (b) see para. 4-4, item 10, a.(1)
7. T-TACAN
   C-LORAN C
   P-Doppler
   I-Inertial Navigation
   A-LORAN A
   M-Omega
   D-DME
   U-UHF radio
   H-HF radio
   Z-other equipment carried
   see para. 4-4, item 10, a.(5)
8. (a) see para. 4-4, item 10, b.
9. (d) see para. 4-4, item 13, a.(1), (a)
10. (c) see para. 4-4, item 15, b.(2)
11. (b) see para. 4-4, item 15, c.(2), (a)
12. (a) see para. 4-4, item 15, f.
13. (b) see para. 4-4, item 17, Note 1
14. (c) see para. 4-4, item 19, a.
15. (b) see para. 4-4, item 19, g.

Flying Hour Milestones

Lt Col Norman G. Gross, 16 TATS
Lt Col Donald James, 8 SOS
Lt Col Raymond McGowan, 7 MAS

Lt Col Daniel B. Ahern, 55 WRS
Lt Col Richard N. Hutcherson, 1 MAS
Lt Col David A. Miles, 8 SOS/CC
Lt Col Walter L. Solak, 22 MAS
Lt Col Gordon F. Wagner, Jr., Det 1, 89 MAW
Maj Beau B. Backman, 187 TAS
Maj Buford L. Barrett, Det 1, 89 MAW
Maj Jeffery L. Brann, 729 MAS
Maj David L. Davenport, 8 SOS
Maj Edwin R. Ganoung, 729 MAS
Maj William I. Harris, 193 SOS
Maj Carol R. Huneycutt, 1 MAS
Maj Robert L. Johnson, 729 MAS
Maj Leonard C. Kearl, Jr., 773 TAS
Maj George Macken, III., 1 MAS
Maj Russell K. McKeel, 187 TAS
Maj Robert S. McKenney, 1 MAS
Maj Robert R. Tindall, 8 SOS

Capt Robert H. Anderson, Jr., 729 MAS
Capt Larry M. Arnold, Det 1, 1402 MAS
Capt David Denton, 11 AAS
Capt Rodger K. Findiesen, 729 MAS
SMSgt Roland O. Cormeir, 729 MAS
SMSgt Timothy M. Kern, 8 SOS
SMSgt Edward F. Kirby, 16 TATS
SMSgt Parks D. Roberts, 156 TAS
MSgt Scott P. Armstrong, 701 MAS
MSgt Frederic W. Hallstein, 729 MAS
MSgt Kenneth D. McHone, 728 MAS
MSgt Jay C. Smith, 1 MAS
TSgt William D. Hamilton, 701 MAS
TSgt Russell L. Hauser, Jr., 73 AAS
TSgt John W. Morgan, III., 728 MAS
TSgt Damon G. K. Oshita, Det 1, 89 MAW
TSgt Gene D. Schouweiler, 187 TAS
TSgt Ronald K. Watson, 75 MAS

Maj Harry W. Whitaker, Det 9, 37 ARRS

Ranks and units are those at time of award. See MACR 900-3 for details on how to apply for your own milestone award.

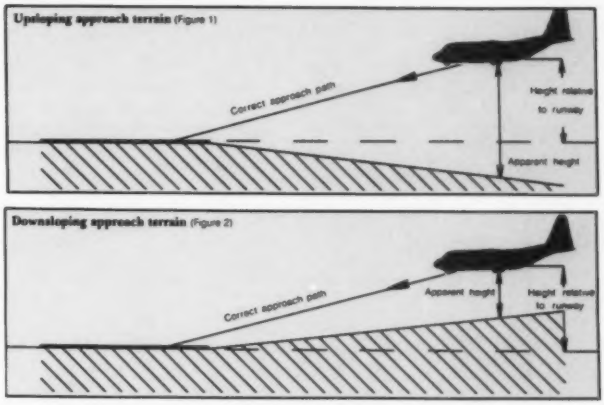
Visual Illusions

Human error" and "approach and landing" are phrases frequently used in describing causes of aircraft accidents. Statistics reveal about *85 percent* of aircraft accidents involve human error as a contributing factor. In addition, about *50 percent* of all accidents occur during the approach and landing phase.

Your primary role in the cockpit is making decisions. In order to do this you must sense and process information. Potential sources of error range from limitations in your senses and perceptual mechanisms to inadequacies in procedures and methods prescribed for the flight crew.

Your senses receive physical stimuli and encode information; perception interprets information and attaches meaning to it. Most of the information you receive comes through your eyes: some comes from instrument displays in the cockpit, but a large amount is obtained from outside the cockpit, often under conditions which may be far from ideal. Indeed, certain conditions may prevent the necessary information from even reaching the eye. More often, a signal reaches the eye but the brain misinterprets and you "see" something else; in other words, you experience a visual illusion. We'll discuss only the illusions, or false perceptions, associated with direct vision.

Visual illusions are fairly common in flying and result from the incorrect interpretation of what you see. This may be due to there being too few visual cues so that you have to fill in the rest of the picture by drawing on your preconception of the situation, by "seeing" what you think you "ought" to see, or simply by guessing. Illusions may also occur when cues presented to the eyes are weak and conflict with relatively strong responses by other senses, particularly those of balance and orientation which have sensors in the inner ears. Knowing what these illusions are can reduce the risk of an accident. Visual illusions during the landing approach may be caused by one or any combination of the following features:



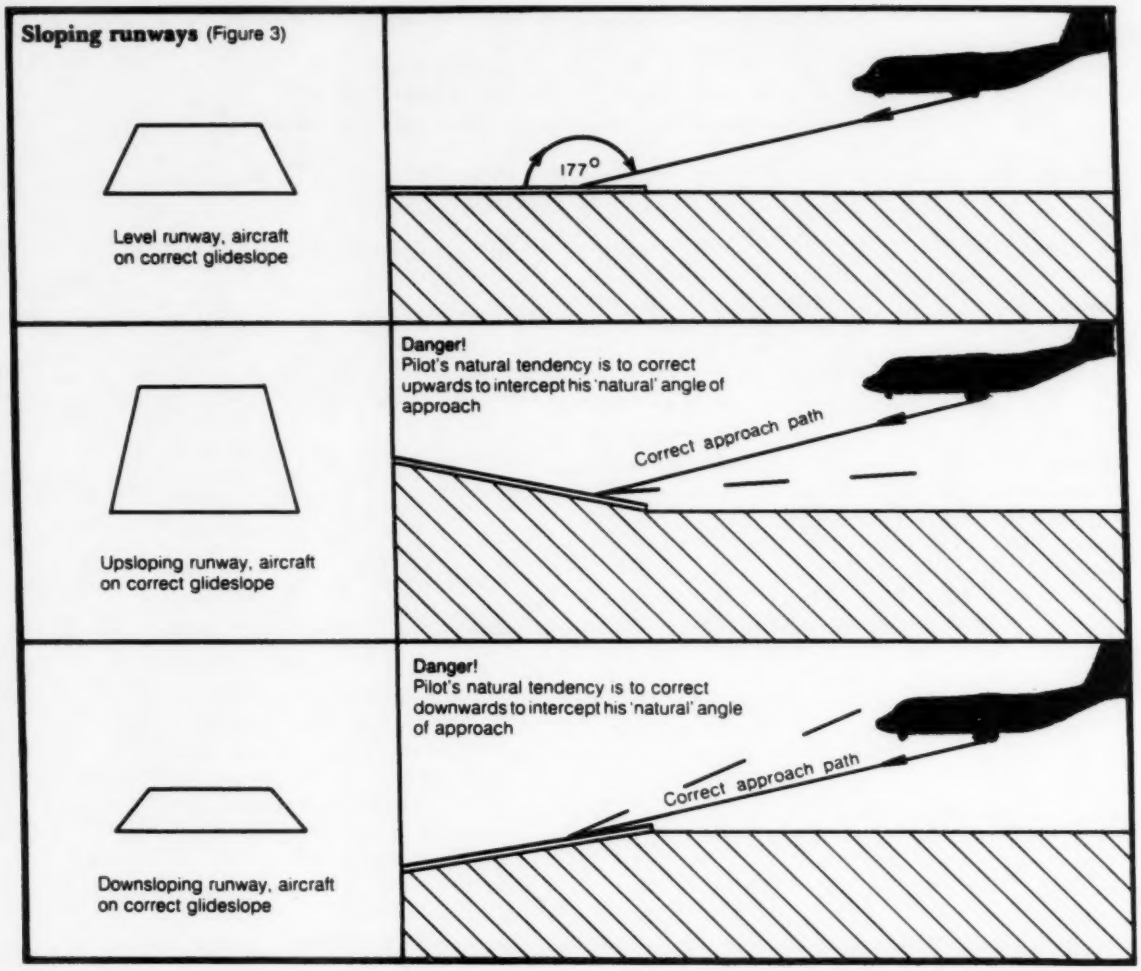
- Sloping approach terrain
- Sloping runway
- Runway width
- Rain on the windscreen
- Featureless approach terrain
- Runway lighting intensity
- Shallow fog
- Rain showers
- Darkness
- Black hole effect

Sloping Approach Terrain

During an approach, the pilot subconsciously judges the approach path from a combination of the apparent distance of the aircraft from the runway and its apparent height above the approach terrain. If the ground under the aircraft slopes upward toward the threshold, you may experience the illusion, particularly during the early stages of the approach, that the aircraft is too high. (See Figure 1.) Conversely, ground which slopes downward toward the threshold gives the impression that the approach path is too flat. (See Figure 2.)

Sloping Runways

Through the regular use of ILS glide paths and VASIs with three degree glide slopes,


Sloping runways (Figure 3)
Level runway, aircraft on correct glideslope
177°
Upsloping runway, aircraft on correct glideslope
Danger!
Pilot's natural tendency is to correct upwards to intercept his 'natural' angle of approach
Correct approach path
Downsloping runway, aircraft on correct glideslope
Danger!
Pilot's natural tendency is to correct downwards to intercept his 'natural' angle of approach
Correct approach path

pilots become accustomed to the complementary angle of 177 degrees between the runway and the approach path (see Figure 3). Additionally from experience, pilots come to know with considerable accuracy the amount of power required to maintain the correct approach path to the point of touchdown. If, however, the runway slopes upward from the landing threshold and the 177 degree relative angle is maintained, a visual approach will be lower than it should be by about the same amount as the runway upslope, and the "usual" power setting will be inadequate to meet the requirements of the flatter approach. If the runway has a downslope, the converse applies so that by maintaining the 177 degree angle relative to the down-sloping runway, the approach to the touchdown point will be steeper and the "usual" power setting will be higher than actually required.

Runway Width

The ability to use the apparent convergence—due to perspective—of two parallel lines to estimate their length is well known. Increasing or decreasing the distance between the lines, however, can create the illusion of shortening or lengthening them. On the approach, a part of the pilot's judgment is based on a mental comparison of the runway of intended landing with the "normal" view of the runway to which he or she is

accustomed. Variations in the runway width, therefore, can be misleading. For example, the wider the runway, the shorter it appears; moreover, the width can also have an effect upon the apparent height of the aircraft in relation to the runway, a wider runway making an aircraft appear lower than it is.

Rain

Heavy rain can affect the pilot's perception of distance from the appoach or runway lights by diffusing the glow of the lights and causing them to appear less intense. This may lead the pilot to suppose that the lights are farther away than they are. On the other hand, only a little scattering due to water on the windscreen can cause runway lights to bloom and double their apparent size, with the result that the pilot believes the aircraft is closer to the runway than it actually is, possibly leading to a premature descent. Similarly, rain on the windshield can cause illusions as a result of light ray refraction. For instance, even though an aircraft is correctly aligned on the approach path, it can appear to the pilot to be above or below the correct glide slope or left or right of the runway center line, depending upon circumstances. The apparent error might be as much as 200 feet at a distance of one mile from the runway threshold.

Featureless Terrain

Visual descents over calm seas, deserts or snow, or over unlit terrain at night, can be hazardous even in good visibility. The absence of external vertical references makes judgment of height difficult and the pilot may have the illusion of being at a greater height than is actually the case, leading to premature or too rapid descent. Height above the runway is also made more difficult to judge if, because of snow for example, there is no contrast between the runway surface and surrounding terrain. The problem is compounded if the descent is made into the sun or in any conditions which reduce forward visibility.

Runway Lighting Intensity

Because bright lights appear closer to the observer and dimmer lights farther away, the intensity of the approach and runway lighting can create illusions. Thus on a clear night, the runway lights may appear closer than they actually are, particularly when there are no lights in the surrounding area.

Shallow Fog, Haze

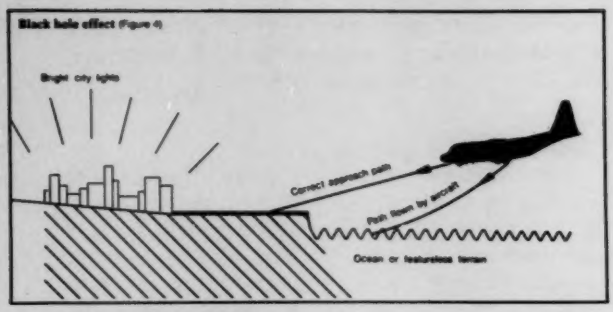
In shallow fog or hazy conditions, especially at night, the whole of the approach and/or runway lighting may be visible from a considerable distance on the approach even though runway visual range or meteorological reports indicate the presence of fog. On descent into such a fog or haze layer, the visual reference available is likely to diminish rapidly, in extreme cases reducing from the full length of the approach lights to a very small segment. This is likely to cause an illusion that the aircraft has pitched up, which may induce a pilot to make a corrective movement in the opposite direction. The risk of descent as a result of this erroneous correction is very real.

Rain Showers

A weather feature which may reinforce a pilot's visual indications that he/she need not apply power to reach the runway or to arrest a high rate of descent is an isolated rain shower. A heavy rainstorm moving toward an aircraft can cause a shortening of the pilot's visual segment—that distance along the surface visible to the pilot over the nose of the aircraft. This can produce the illusion that the horizon is moving lower and, as a result, is often misinterpreted as an aircraft pitch change in the nose up direction. A natural response by a pilot would be to lower the nose or to decrease, not increase, power.

Darkness

The greatest illusion potential exists at night. Darkness provides excellent camouflage and the eye loses much of its efficiency. Normally used cues such as shadows, color and detail are not available. Lights must compensate for this loss, but lights usually lack sufficient definition to provide more than an outline, an incomplete stimulus to which the pilot may or may not react correctly. At the other end of the scale we have a profusion of lights. Large airport complexes have so many lights that often there is considerable difficulty in just finding the runway!



Black Hole Effect

This illusion can occur on a clear night with no visible horizon. The aircraft approaches the runway over the sea or other featureless, unlit terrain, toward an airport with bright city lights behind it (see Figure 4). Visibility is so good that there is little need to rely on the instruments except to check the airspeed. The straight-in approach is totally uneventful until the aircraft lands short of the runway, possibly by several miles. What could have gone wrong?

Tests have shown that under these circumstances a pilot relying on a visual approach will tend to fly along the arc of a circle centered above the pattern of city lights with its circumference contacting the terrain. Such a path results from maintaining a constant visual angle subtended at the eye by the nearest and farthest city lights. When deceptive conditions are present, such as upsloping city terrain, this kind of approach path can go to critically low altitudes. The lack of foreground lighting results in the pilot being unaware of important closure information and consequently the aircraft lands short.

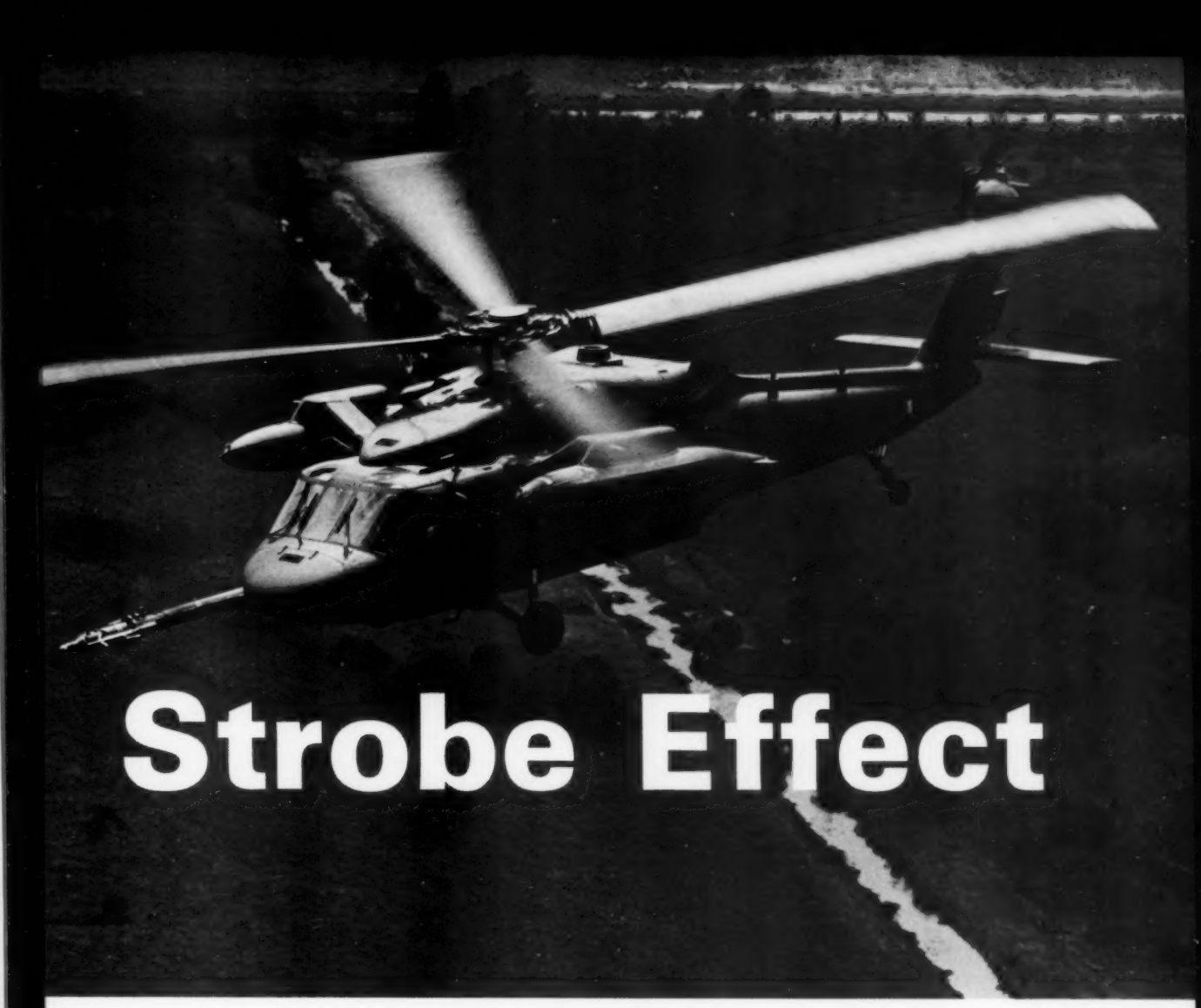
Avoiding The Problem

Stay aware of the circumstances in which visual illusions may occur and be prepared to take corrective or alternative action. Learn to recognize impending situations which may place the safety of the aircraft and its occupants in jeopardy.

- Study airport charts, maps, and other reference material to determine runway slope, the slope of terrain around the airport, the relative position of the airport and surrounding features, the airport approach and runway lighting in use, etc.
- Anticipate the need for rain repellent on the windshield and use as appropriate before departure.
- Use ILS or VASIs wherever available to monitor the glide slope. If DME is located at the airport, use the "rule-of-thumb" 300 feet per nautical mile for your descent profile, but remember to take into account the relationship of the DME beacon to the threshold of the runway in use.
- Consider requesting an alternative runway with precision aids if the active runway has no such approach aids. *(Editor's Note--Remember, MAC Reg 55-XXX requires us to fly a precision approach at night when available.)* If no precision aids are available, consider flying a non-precision approach instead of a visual straight-in. The aircraft can be more accurately positioned at 600 feet on a two-mile final having flown a non-precision approach than on a straight-in approach without aids. It may also be possible to position the aircraft at a known point, such as over a locator, at the correct altitude and approach configuration. The pilot should then obtain a visual image of the runway and maintain this image throughout the approach. If none of the foregoing procedures are possible, consider diverting to a more suitable airport.
- Use the monitored approach technique. One pilot flies the instrument approach while the pilot who is to land the aircraft monitors the approach and gains "experience" of the ambient conditions before taking over control.
- Avoid landing expectancy during all operations and be prepared to go around or carry out a missed approach if there is any doubt about the safety of the landing. Wherever possible, pilots should receive training flights to airports where it is known that conditions can be conducive to visual illusions.

Illusions must be expected in flying. It is human nature to believe our own senses rather than the instruments. Knowledge of illusory sensations will help because our responses are determined more by the meaning we attach to the stimuli than by the stimuli themselves. It is ultimately on the basis of knowledge and self discipline that we make decisions and select our responses. Remember, the expression "seeing is believing" isn't always right.

courtesy of: *Flight Crew Magazine*



Strobe Effect

From mild discomfort to loss of consciousness.

Strobe-Effect-Induced Seizures in Flight

This incident occurred during a routine cross-country helicopter flight. Five minutes after departure on the return flight, one of the maintenance personnel riding as a passenger suffered what appeared to be an epileptic fit. He first went into convulsions and then stopped breathing. While a crewman applied CPR (cardiopulmonary resuscitation), the pilot turned back, notified the tower of the problem, and asked for an ambulance. Prior to landing, the man had

resumed breathing on his own but was still unconscious. He was transported to a hospital emergency room, upon landing.

A thorough check of the man's medical record revealed no previous incident or susceptibility to seizures. He was diagnosed as having had a "strobe effect-induced grand mal seizure." The man said that prior to the seizure, the strobe effect of the sun shining through the rotor blades had been mildly discomforting. Another aircraft incident report illustrates the danger involved when a pilot at the flight controls experiences such a seizure.

Prior to returning to home base, while the helicopter was in a turn close to the ground, the copilot remarked that the light passing through the rotors was making him feel bad. The pilot asked if he was too ill to continue. The copilot replied negative. Several minutes later at 800 feet MSL the copilot again remarked that the light through the rotors was making him "feel funny." Approximately one minute later, the pilot noticed a sharp decrease in collective. He noticed that the copilot was very rigid with his hand on the collective. The pilot pulled up the collective and requested a crewman's assistance in getting the copilot off the controls.

During his seizure and his accompanying thrashing about, the copilot knocked the engine lever out of FLY, shutting down the number-one engine. The pilot declared an emergency, managed to remove the copilot from the controls and made a safe landing.

The suspected cause of this incident was "flicker vertigo." One recommendation was that "pilots of all aircraft, but especially helicopter pilots, should be reminded that under certain conditions, they may be susceptible to flicker vertigo. Such vertigo will be at least disorienting, and at worst, completely incapacitating."

Although not a common occurrence, the possiblity of aircrew seizure while flying is a very real danger. We can all imagine the terrible consequences of a pilot suffering a seizure in a single-piloted aircraft or during certain flight regimes, e.g. landing, takeoff, low-level.

All crewmembers, but especially those flying helicopters and prop-driven aircraft, should be aware of this phenomenon and its possible catastrophic results.

Flicker-Induced Seizures

There are countless ways in which normal flight operations can cause flickering in the critical frequency (1-20 flashes/sec). Having an anti-collision light on in the clouds, flying past a row of clouds through which the sun is shining, operating a single-engine prop plane at low RPM while facing the sun, can all cause the flicker phenomenon.

Fortunately, seizures during flight are very rare. Even with the best screening techniques, though, seizures will occasionally occur. Aircrews need to be able to recognize them and be prepared to administer proper first aid measures.

Symptoms of a Seizure and First Aid

The victim may complain of feeling strange or there may be no warning at all. He or she may cry out, and if standing, will fall and lose consciousness. The person's muscles will first become tense, causing the body to become rigid. Breathing may stop temporarily, and the body will spasm. The breathing usually resumes, but is labored if the tongue has fallen back and is blocking the airway. The victim may bite his or her tongue, froth at the mouth or lose bowel and bladder control. The seizure is usually over within a few minutes, but the victim may remain unconscious or semiconscious for a time.

First Aid: Place a gag between the victim's teeth to prevent biting the tongue. Something flexible is recommended, but *never* your hand. Don't force anything into the victim's mouth; it will only cause injury. Loosen the patient's clothing and make sure he or she starts breathing again and has an open airway. Use CPR if necessary, although it's rarely needed. Protect the patient from injury during spasms, but do not forcibly restrain. Keep the victim warm and quiet and turn his or her head to the side to prevent choking should vomiting occur. Finally, any person suffering a seizure should be taken to a doctor immediately.

courtesy of: *Flight Crew Magazine*

Wake Vortices

by Lt. Col. Richard A. Rasmussen
HQ MAC/DOW

The invisible killer.

The airlift community is familiar with wake vortices created by aircraft during takeoff and landing. We've been thoroughly briefed on the dangers of vortices, the accidents they've caused, and the ongoing studies into their effects. We also participate in the training developed as a result of the knowledge gained through these studies. Most of this training centers on the effects close to terra firma where encounters with vortices are most common and create the greatest anxiety. But did you ever stop to think what happens to those swirling wake vortices during flight? Folks, we have some good news and we have some bad news!

The good news is we haven't had that many identifiable problems with wake vortices during formation flights and airdrop operations. That may be because wake vortices are usually invisible and it's tough to blame short-term wind gusts and turbulence on an unobservable force. Also, most airdrops occur at or above 600 feet AGL. The vortices decay as they descend so the wind created by the swirling air mass is normally less than 15 kts. But as we said, that's the good news. The bad news is that those little hummers are still out there doing their thing. A large transport aircraft full of fuel, people and equipment, plowing through the air at slow speeds with its "barn door" open in preparation for airdrop, sets up a potentially dangerous situation.

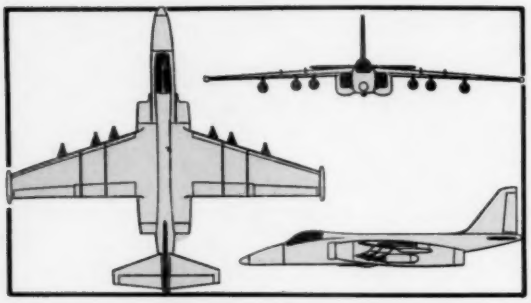
Theoretically, a C-141 configured for airdrop at 600 feet AGL could create 13 to 27-knot winds within 20 feet of the ground. These "little" winds could linger up to one and a half minutes after the airdrop. A three to five-knot crosswind could hold the vortex on the drop zone. There is no way to precisely forecast these isolated and potentially dangerous gusty winds

Suppose the vortex does not descend as advertised, but stays at altitude (as has been actually observed). Aircrews in subsequent aircraft in the formation could have their hands full keeping wings level while trying to figure from whence cometh all the "chop."

For larger "gaggles" of airplane, what happens when these vortices start running into each other? Do they synergize each other's decay, is their life extended, or can such a critter as a "super vortex" be made? Due to the challenging and unpredictable nature of this beast, we may never know!

One thing is certain, however. If you're flying or parachuting, especially within 1,000 feet of the ground, be ready for the unexpected. Remember, some airdrop mishaps have probably resulted from the effects of wake vortices and *not* the never-ending efforts of somebody named Murphy! So be aware!

World Aircraft Recognition Guide



Sukhoi SU-25

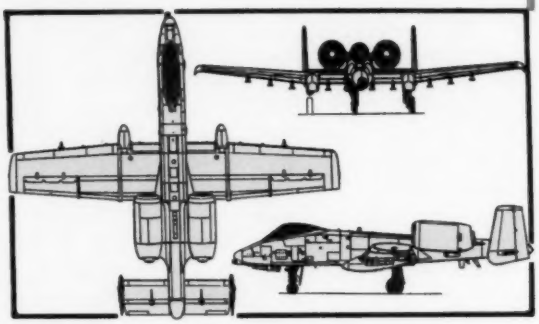
NATO name: "Frogfoot"

Intelligence sources first observed the "Frogfoot" by satellite over the Ramenskoye flight test center in the late 1970s. Then given the designation Ram-J, it is thought to be a product of the Sukhoi design bureau. First photos became available in December 1982 following deployment of Su-25s to Afghanistan.

The configuration of the Frogfoot is more like the Northrop A-9 (the losing design in the Air Force's AX close air support aircraft competition) than the A-10. In particular, the Frogfoot's non-afterburning turbojets are mounted in long nacelles in the wing roots. Evident in the drawing is the single fin and rudder, an easy identification feature. The Frogfoot is also believed to be armed with a heavy-caliber Gatling-type gun. The Su-25 is thought to have slightly better overall performance than the A-10.

Dimensions

Wing span	50 ft. 10 in.
Length	47 ft. 6 in.
Weight (Max t/o)	36,050 lb.



Fairchild/Republic A-10A

"Thunderbolt II"

The A-10 is a highly maneuverable, single seat close air support aircraft. The main armament of the "Warthog" is the General Electric GAU-8/A 30mm, seven-barrel cannon, a lethal weapon against tanks and just about anything else that happens to get in the way. A-10s were designed from the outset to survive in a high-threat environment, the pilot's cockpit being wrapped in titanium armor and able to withstand 23mm projectiles.

The A-10 is readily identifiable. Its twin GE TF-34 turbofans are mounted near the tail and exhaust between the two vertical stabilizers. The low-mounted wings have hard points for carrying a wide variety of bombs and missiles. Finally, the large, bullet-proof bubble canopy sits prominently atop the nose of the A-10, giving the pilot an almost unobstructed view.

Dimensions

Wing span	57 ft. 6 in.
Length	53 ft. 4 in.
Weight (Max t/o)	50,000 lb.

C.R. Terror

The Sultan of Seafood sours the shrimp.

Pack your bags, Sammy, m'lad," boomed the Buffoon of Bourbon Street. "We are headin' for New Orleens!"

Long Suffering Sam instinctively ducked down in his chair and threw his hands up in a futile defensive gesture. "What d'ya mean, 'we,' Boss?" Sam asked.

"Tsk, tsk, Sammy. I *am* surprised at you. Disappointed, even," C.R. indicated, shaking a finger at his trusty copilot in mock scorn. "I'll have you know we have been selected to ferry one of our flying-type machines down to PDM."

"So, what's so unusual about that?" piped up Blinky, sensing another overwater nav trainer about to fall in his lap.

C.R. shook his head slowly. "This is not just your average, run-of-the-mill PDM input. First of all, we'll be flying direct to New Orleans for a static display *before* flying overwater."

Immediately, the crew saw the light. "Oh, I get it. We let everybody and his dog crawl through the plane, *then* we give it to the PDM folks. Is that it?" piped up Max, C.R.'s flight engineer.

"But there's more. My old friend Claude 'Feather' Marchant has kindly volunteered the use of his car while we're in New Orleans."

"Sounds like a license to steal, Boss," interjected Ty Downs. "What did you promise the schedulers—a year remote to Thule for each of us?"

"Nothing so mundane, Ty old bean," C.R. corrected. "As a matter of fact, all we have to do when we get back is pull a week of taxi preflight . . . "

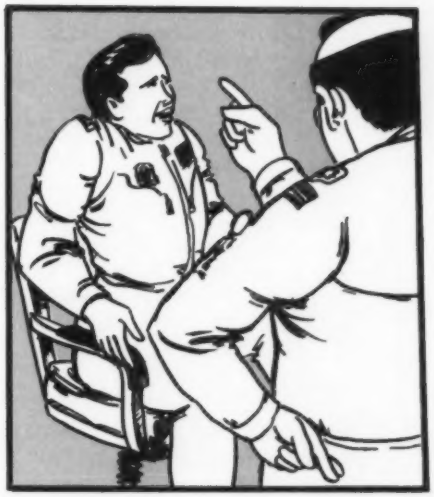
"Only a week's worth?" asked Sammy, cutting his Alpha Charlie off in midthought.

"Well," corrected C.R. "that's one week of day taxi preflight and one week of *night* taxi preflight."

Ty, Max, Sammy and Blinky turned three different shades of red as they exclaimed in perfect four-part harmony, *"Two weeks of taxi preflight in a row!"*

"Boss, how could you?" asked Sammy, speaking for all of the crew. "I had planned to take some leave when we got back. You could've *asked* the crew if they had any other plans before committing us to this trip."

"I suppose you're right, m'lad," C.R. said apologetically, as he scraped his flight boot across the floor in the manner of a scolded child. "But I did have my, er, *our* best interests at heart. The least you can do is allow me to buy you all some fresh shrimp before we get ready to come back."



"Sure, Boss," piped up Max. "How about *20* pounds of jumbo, please."

"We'll have the same," pitched in Sammy, Blinky and Ty simultaneously, sensing a unified front would deter the Selfish Sultan from further excursions without their collective inputs.

C.R. tried in vain to lessen the collective evil about to be lavished upon him. "Don't you think a couple of pounds of shrimp per person would be enough? Think about your cholesterol level."

"And I suppose you weren't going to buy any for yourself, were you?" asked Sammy, beginning to sense the real reason C.R. had acted so hastily to have his crew put on the trip.

"Well, if the truth must be known . . . . "

"It *must*, Boss," Sammy said, "it must!"

"Well, you see, Feather runs a wholesale fish warehouse down there. Said he'd make me a special deal on all the shrimp I wanted—about two dollars a pound . . . "

"*Two* dollars a pound for fresh shrimp, Boss?" C.R.'s stalwart navigator was fit to be tied.

"Make that *40* pounds of shrimp, Boss," Max smiled wryly, "*per* person."

"I'll see you at the airplane," C.R. waved dejectedly, "but bring your own ice chests."

A couple of days later, the Herky Honcho and his crew were cleaning up the last bits of debris left behind by the curious hordes who had thronged through their charge. After filling and emptying two 30-gallon trash cans, the crew—minus the Rhinestone Flyboy—sat down to take a breather prior to their departure.

"Boy, those people really enjoyed the open house, didn't they Sammy?" Blinky grumbled.

"Yeah, they sure did," replied Sam. "But I don't remember people bringing on this much garbage." Sammy tossed another popcicle stick into the waiting plastic sack. "Maybe it's a good thing this bird is going to PDM so they can complete the cleaning and restoration job."

"Right you are, Sammy and Blinky," piped up C.R., having just arrived on the scene, missing the fun of preflight clean-up. "But look on the bright side. Our shrimp is on the way. Feather said a truck would be arriving shortly with all of our orders, duly packed in ice, of course. Are we preflighted and ready to go, Max?"

"Speaking of preflights," Max said, "I still have to do the intake inspection."

"Oh, *I'll* do that, Max," interjected the Rotund One. "You go ahead and finish up the interior inspection."

"Are you sure you can handle something as important as an intake inspection, Boss?" asked Max in all seriousness.

C.R. looked incensed. "I'll have you know I was inspecting intakes of Gooney-birds while you were still watching Pat Brady double-clutch Nellybelle!" Max couldn't argue that point, so C.R. grabbed the ladder and, amazingly, tripped lightly down the cargo ramp and around to the front of the Herk. Once in place, he clambered up the ladder to take a look at the pointy end of the number four Allison engine. At that particular moment, though, Feather Marchant arrived with the shrimp.

"Mon ami," called Feather to his friend, "where do you want this shrimp?"

"Feather, old boy! Good to see you," returned the Sultan of Shrimp as he

climbed down the ladder. "I'll get Ty and Blinky to help you, er, us and we'll load it on board. Watch the prop arcs as you drive around the wingtip."

"Oh, oui oui," nodded Feather. "You know I still have flight line privileges on my Air National Guard driver's license."

With that, the Fabulous Foursome and C.R. unloaded the crew's 40-quart coolers packed to the brim with shrimp and ice.

"Did you complete the intake inspection, Boss," yelled Max after the Herky Honcho had retrieved the ladder.

"Well, close enough," C.R. called back. "Are you ready to light the fires?"

"Just say the word, Boss," Max said. "Ready when you are."

Some two hours after takeoff and somewhere over the Gulf of Mexico, C.R. and his crew droned along on the overwater nav trainer.

"Uh, engineer, loadmaster. Can you turn down the heat a bit," asked Ty politely.

"Can do, load," replied Max, giving the cargo compartment rheostat a slight turn. "How's that?"

"Well, I suppose it will take a minute or two to cool down," replied Ty, "but it feels as if it's getting hotter by the second. You're still putting out a ton of hot air back here. If you don't do something pretty soon, all the ice in the coolers is going to melt."

C.R., who had been dozing lightly, sat bolt upright and looked his competent engineer squarely in the eye. "Do *something*, Max!" The Truculent Titan's eyes were wide open with thought of losing almost one hundred pounds of his own shrimp, not to mention that of his crew.

"Nothing I do up here seems to be working," a calm but busy Max said. "It looks like the cargo compartment air conditioning has gone totally haywire, and the only way I'll be able to control the heat is to turn off the bleed air and depressurize."

"But then we'll have to descend to warmer air, right?" asked Blinky.

"Looks that way, sir," replied Max. "You can have your hot air up here or down there. But that's your decision."

"Never mind the heat, engineer," a concerned Sammy said. "Looks like we have a fire warning light on the number-four engine." Ominously, a steady red light glowed in the number-four engine's T-handle. "Ready to shut down when you are, pilot."

"Cage it, Sammy," said a discouraged C.R.

"Number four condition lever, feather!" called Sammy. The number-four prop immediately stood tall and the fire light went out. Sammy and Max then completed the rest of the checklist procedures, and Sammy declared an emergency with everyone concerned. The Ace of Airways headed the Herk for the nearest suitable airfield.

After three hours of droning along at 10,000 feet, with the hot summer air baking them—and their load of shrimp—the Aromatic Aviators finally landed. Despite one inoperative engine, they rocketed into their parking spot and shut down. Almost immediately, the ramp opened and a strange apparition literally streaked past the crew chief standing nearby. It was Ty Downs wearing a smoke mask and carrying a portable oxygen bottle.

"Air! Gimme air!" was all the crew chief could hear him gasp. In short order, Ty was followed by the rest of the crew, leaping from the malodorous Hercules.

"That's the foulest stench I've ever smelled," coughed the crew chief. "What have you got in there, anyway? Maybe two thousand pounds of rotting carp?"

Tears came to C.R.'s eyes as he tried to tell the crew chief that all they had on board was shrimp—260 pounds of thoroughly *spoiled* and highly aromatic shrimp.

"Well, I'm sorry about your misfortune, but I understand the officer's club has a pretty good menu tonight," the crew chief said, trying to soothe the down-trodden crew.

"What's that, my good man?" C.R. asked, brushing away some of the flies now swarming around the plane.

"Why, 'Three-Way Shrimp,'" the airman began. "Boiled, broiled and fried," he said smilingly. "And only $14 a pound."

Quick Stoppers

~~Practice~~ Actual Shutdown

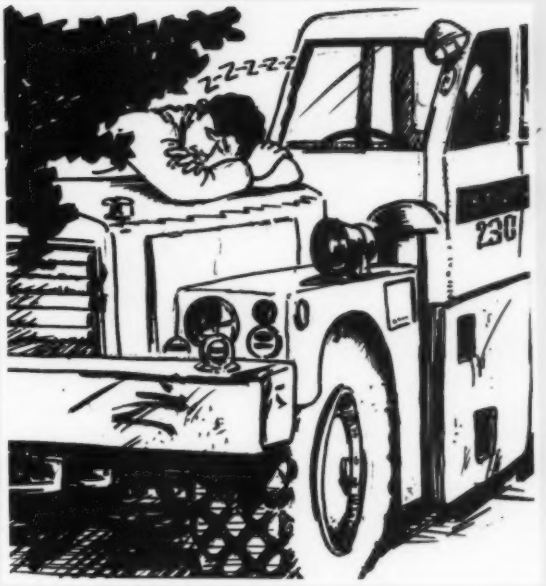
The training syllabus called for a practice engine shutdown, so that's exactly what the crew of a C-12A did. Unfortunately, once shut down, the engine stubbornly refused to restart, going so far as to pop the number-two ignition circuit breaker. The crew alertly caught the open circuit breaker trick, reset it and attempted another restart. Unfortunately, the recalcitrant engine popped the CB again, so the crew discontinued the start. Following an uneventful single-engine landing at the home field, the crew turned the aircraft over to the maintainers. They quickly discovered the cause of the problem. The number-two engine ignition exciter had failed, ensuring any attempted start would be unsuccessful.

Micron Management

A routine intersection takeoff turned very exciting for the crew of a C-23 recently. As their aircraft accelerated through 75-80 knots, the number-two engine rolled back without warning. Because of the airspeed and runway remaining, the crew continued the takeoff and made an uneventful single-engine landing a few minutes later. When the maintenance folks began looking for a cause of the rollback, they found a blocked filter in the bleed air control line of the fuel control. The filter involved was a 3-micron filter, which was surprising since those filters had supposedly been replaced by 10-micron filters as directed by a 1981 service bulletin from the engine manufacturer. How the 3-micron filters got into the system is unknown, so maintainers checked the other C-23 aircraft and ensured all are now equipped with the proper filters.

No Way?

Just when we think something is impossible, somebody proves us wrong. Such was the case with the crew of an ANG C-130 recently. Tasked to move some personnel and equipment from a southwestern US base, the Herk's crew quickly loaded the cargo, which included a tow tractor, and pax. Shortly after takeoff, the passengers noted exhaust fumes in the cargo compartment, but thought they were coming from the aircraft. Two hours later, a passenger leaned on the tractor and noted it was warm. A nearby loadmaster explained it was probably warm because of air from overhead vents. A closer examination revealed warm air blowing from the radiator. After waking a passenger who was sleeping on the hood of the tractor and asking him to move, the loadmaster opened the hood and discovered the tractor's engine *was still running.* A quick turn of the ignition key solved the problem, but did nothing to remove the red faces of the loadmasters.



Hatch Act Revisited

The Starlifter was on the final leg of the mission and descending through FL 240 toward the homedrome. Suddenly, the peaceful descent was shattered when the number-two hatch opened causing a rapid decompression. Immediately after the hatch opened, the emergency escape rope, ladder, and part of the crew loft privacy curtain exited the aircraft. The escape ladder added injury to insult by inflicting minor skin damage to the aircraft as it flailed about. The crew quickly regained their wits and made an uneventful landing at their home field. A detailed investigation of the hatch revealed the latching points at the trailing edge failed due to stress cracks, allowing the hatch to open. Investigators suspect improper rigging may have contributed to the formation of the stress cracks.

Quick Stoppers

Nearly-Missed Civilian

Cleared to FL 230, the four-engine aircraft was approaching 16,000 feet when the air traffic controller advised the crew, "traffic, 11 o'clock, 3 miles, westbound." The traffic was partially blocked by the cockpit windshield frame, and in the same relative position as the rising sun. About 12 seconds after first being notified of the traffic, the crew spotted the aircraft and pulled up enough for it to pass beneath them. Estimated separation of the two aircraft was 200 feet vertically and 2,000 feet laterally.

The air traffic controller continued to track the civilian aircraft to an airport and contacted the pilot who readily admitted to flying the aircraft in question, and further remarked that he was never closer than 1,000 feet vertically and 2½ miles laterally. When queried further, however, he refused to give either his name or the tail number of his aircraft.

After this, a National Track Analysis Program (NTAP) was used to reconstruct the flight paths and altitudes of both aircraft. The NTAP study showed the actual separation of the two aircraft was approximately 200 feet vertically and three-tenths of a mile laterally. The NTAP also showed that the civilian aircraft had made several heading changes which increased the chance of a near mid-air collision.

Finally, it appears everyone was doing the job they were supposed to, complying with all applicable regulations. The VFR traffic observed by the controller had just come onto the outer edge of his radar scope, therefore the civilian aircraft was only observed for a short period of time. Remember that IFR traffic is tracked by the ATC computer, but VFR traffic is not. Add to this the lack of radio contact with the civilian airplane and it's clear that everyone was very lucky in this case. The see-and-avoid concept is still the primary means of midair collision avoidance.

After Deadlines

MAC HELICOPTER CRASHES IN ALASKA—An HH-3E assigned to the 71 ARRS, Elmendorf AFB, Alaska, crashed during a rescue attempt on 30 April. The crew was on a mission to rescue a civilian pilot stranded on Eagle Glacier, located 28 miles east of Elmendorf AFB, when the mishap occurred. No one was injured in the crash, although the helicopter suffered significant damage. The mishap is currently under investigation.

C-5A SETS RECORDS—The National Aeronautical Association (NAA) and the Federation Aeronautique International (FAI) recently announced certification of three world and national aviation records set by the Lockheed C-5A. The Galaxy set the records during flights on 17 December 1984, and 16 January 1985.

The world record, certified by FAI, is for "the greatest payload lifted to 2,000 meters." The C-5A set the new record, 245,731 pounds, on 17 December, erasing the previous record of 154,590 pounds set in 1976 by a Russian Ilyushin IL-76.

During the 17 December flight the C-5A also was credited with "the greatest recorded weight at which any aircraft has ever flown," with a gross weight of 920,836 pounds. The NAA certified this as a new US national aviation record.

Finally, on 16 January 1985, a C-5A recorded a landing weight of 876,762 pounds, a US record for the heaviest aircraft ever landed. The American organization has requested the FAI establish official world categories for the inflight and landing weights. (Information courtesy of Lockheed-Georgia company).

NIGHT VISION EQUIPMENT USED IN RESCUE—An Air Force Reserve CH-3E helicopter crew recently used their sophisticated night vision equipment to rescue an injured man whose hang glider had crashed on a mountainside. The crewmembers, assigned to the 302 SOS, Luke AFB, Arizona, were on a training sortie when they were diverted to search for the victim. Using their night vision equipment, they were able to pinpoint the victim some 200 feet from the peak of the mountain. Two members of a mountain rescue team had reached the injured aviator after dark and helped place him on a litter lowered by the CH-3 crew. After hoisting the injured man aboard, the special operations crew quickly transported him to a nearby airport and a waiting ambulance. (AFRES News Service).

☆U.S. GOVERNMENT PRINTING OFFICE: 1985 564 018 20003

THE 10 COMMANDMENTS OF GOOD CREW COORDINATION

I Aircraft Commanders
Think People!
Remember you are working with people who have feelings of worth, need and dignity.

II Aircraft Commanders
Set The Tone!
If you're the director of a one-man band, you won't foster much crew coordination. You, the pilot, set the tone of the crew. If you encourage and are receptive to an exchange of information, you'll probably get it. Also, let each crew member know what you expect of him.

III Aircraft Commanders
Solicit Information!
Ask for opinions or suggestions. It's not a sign of command weakness to ask what the other crew members think.

IV Aircraft Commanders
Use Other Crew Members' Experience!
That old engineer probably has a lot of experience which can help you. Use it.

V Crew Members
Don't Be Shy!
If you've got something bothering you, speak up. You may know something that someone else doesn't know.

VI Crew Members
Be Persistent!
Keep the pilot and other crew members informed. Don't let one crew member snuff you out.

VII Crew Members
Remember Who's In Command!
Make your input to the boss but remember he makes the final decision.

VIII Aircraft Commanders and Crew Members
Be Tactful!
Don't close the channels of communication in crew coordination through immature or unprofessional behavior.

IX Aircraft Commanders and Crew Members
Reinforce Good Coordination!
When your crew flies a successful mission, it involves a lot of successful efforts by your crew and other support people. Reward people for special efforts with a thank you or a letter to their commander. Remember, a small "thank you" goes a long way with the other crew members and team players.

X Aircraft Commanders
Don't Shirk Your Responsibility!
Think people; set the tone for crew coordination; solicit information; use experienced people; reinforce good coordination; BUT, remember you must make the final decision and be responsible for it.